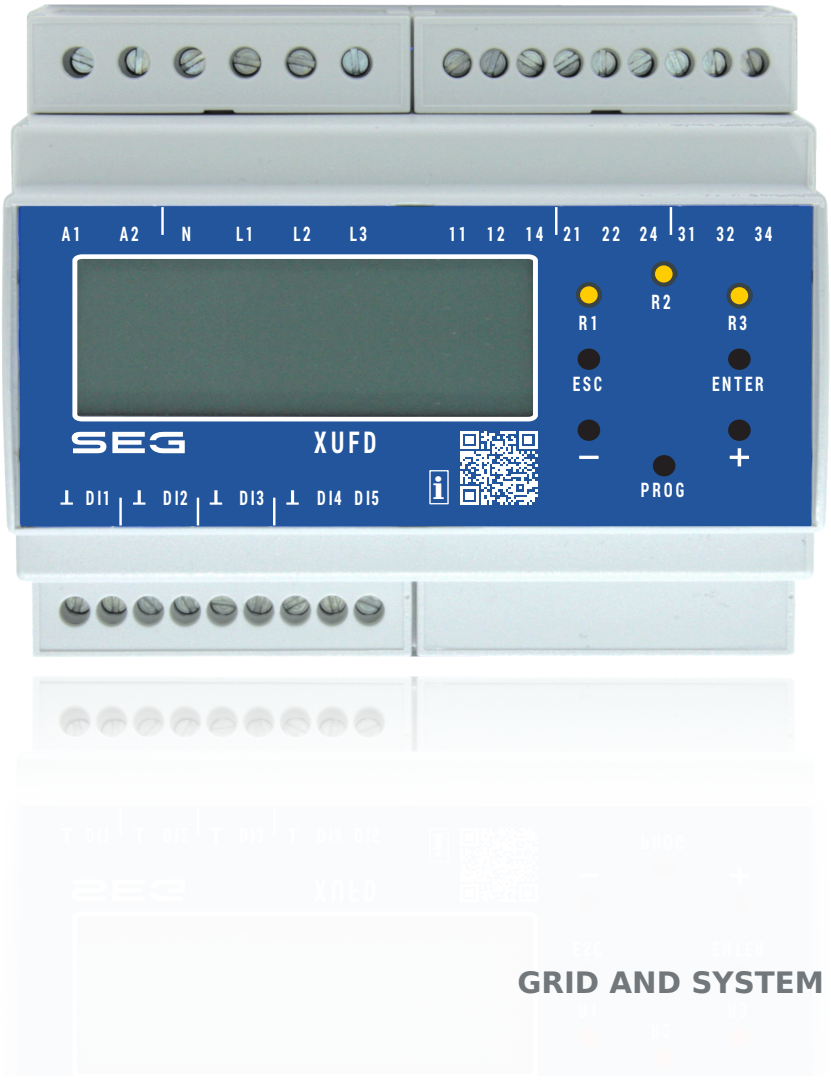
PROTECTION MADE SIMPLE.

SEG electronics

# Professional Line

# XUFD

## GRID AND SYSTEM PROTECTION RELAY




**GRID AND SYSTEM PROTECTION RELAY**

REV.: A

Original document

English

**BASIC MANUAL XUFD-A-EN-MAN**

**SEG Electronics GmbH**

Krefelder Weg 47 • D–47906 Kempen (Germany)

Telephone: +49 (0) 21 52 145 0

Internet: www.SEGelectronics.de

Sales

Telephone: +49 (0) 21 52 145 331

Fax: +49 (0) 21 52 145 354

E-mail: sales@SEGelectronics.de

Service

Telephone: +49 (0) 21 52 145 600

Fax: +49 (0) 21 52 145 354

E-mail: support@SEGelectronics.de

# Table of Contents

# 1 Safety Messages and Proper Use of the XUFD

## 1.1 Proper Use of the Device and of This Manual

**DANGER!**

Never carry out work on live parts! Danger of fatal injury!

The XUFD must not be used in case of obvious damage!

To be installed by an authorized person only!

Ignoring the following safety messages can result in death or serious injury or physical damage.

**CAUTION!**

Do not put the XUFD in service until it has been configured and commissioned.

**WARNING!**

FOLLOW INSTRUCTIONS

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

***Out-of-Date Documentation?***

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, please visit the download section of our website:

- **https://docs.SEGelectronics.de/xufd**

Please check this download area for the latest revision of this Technical Manual and whether there is an Errata Sheet with updated information. (The ID of every document is printed on its cover page.)

**WARNING!**

PROPER USE

The XUFD is a multinational grid and system protection unit, that protects energy generation plants (like combined heat and power plants, wind generators, waterpower plants, photovoltaic plants).

In case of power failures or net anomalies, power gererating plants have to be disconnected immediately from the mains supply to avoid unintentional feeding to the grid. On the one hand continuing grid feeding could endanger maintenance staffs, on the other hand connected devices could be exposed to inadmissible voltages and/or frequencies.

In case the grid operator requires thresholds and settings that are not conforming with the local standards, it is possible to set thresholds outside the normative defined range! Outside these range the device is not in accordance with the standards anymore and the corresponding certificate loses validity!

This state is indicated as „ncnf“ [none conformity] on the display. Settings outside the conformity range are therefore in responsibility of the operator respectively the acceptance authority!

# 2 Installation and Wiring

## 2.1 Dimensions and operating elements

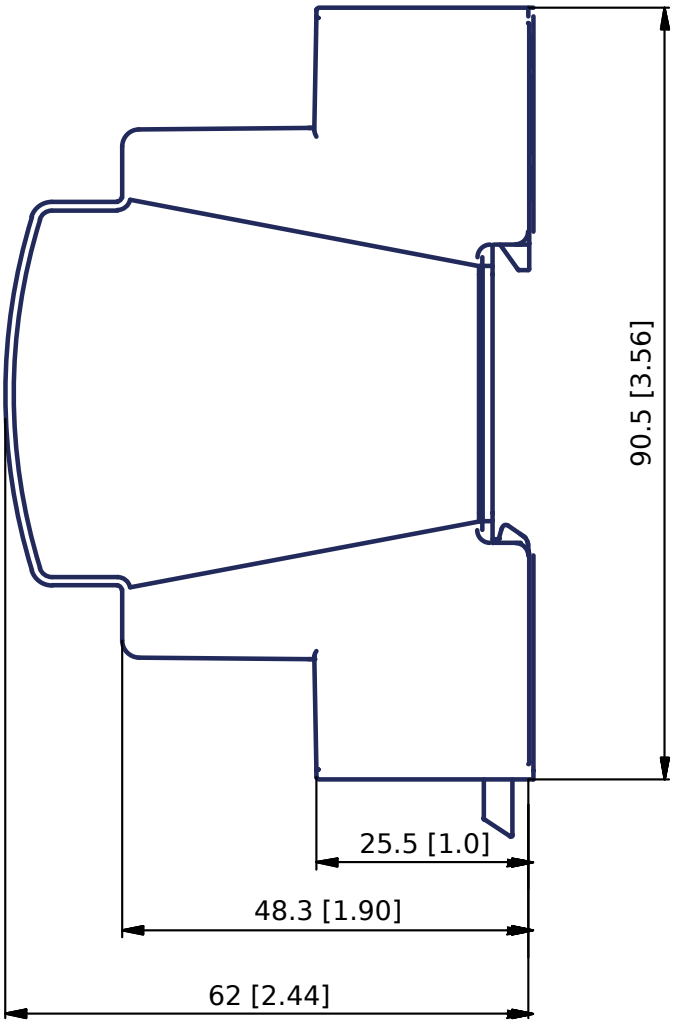



*Fig. 1: Side View. All dimensions in mm, except dimensions in brackets [inch].*

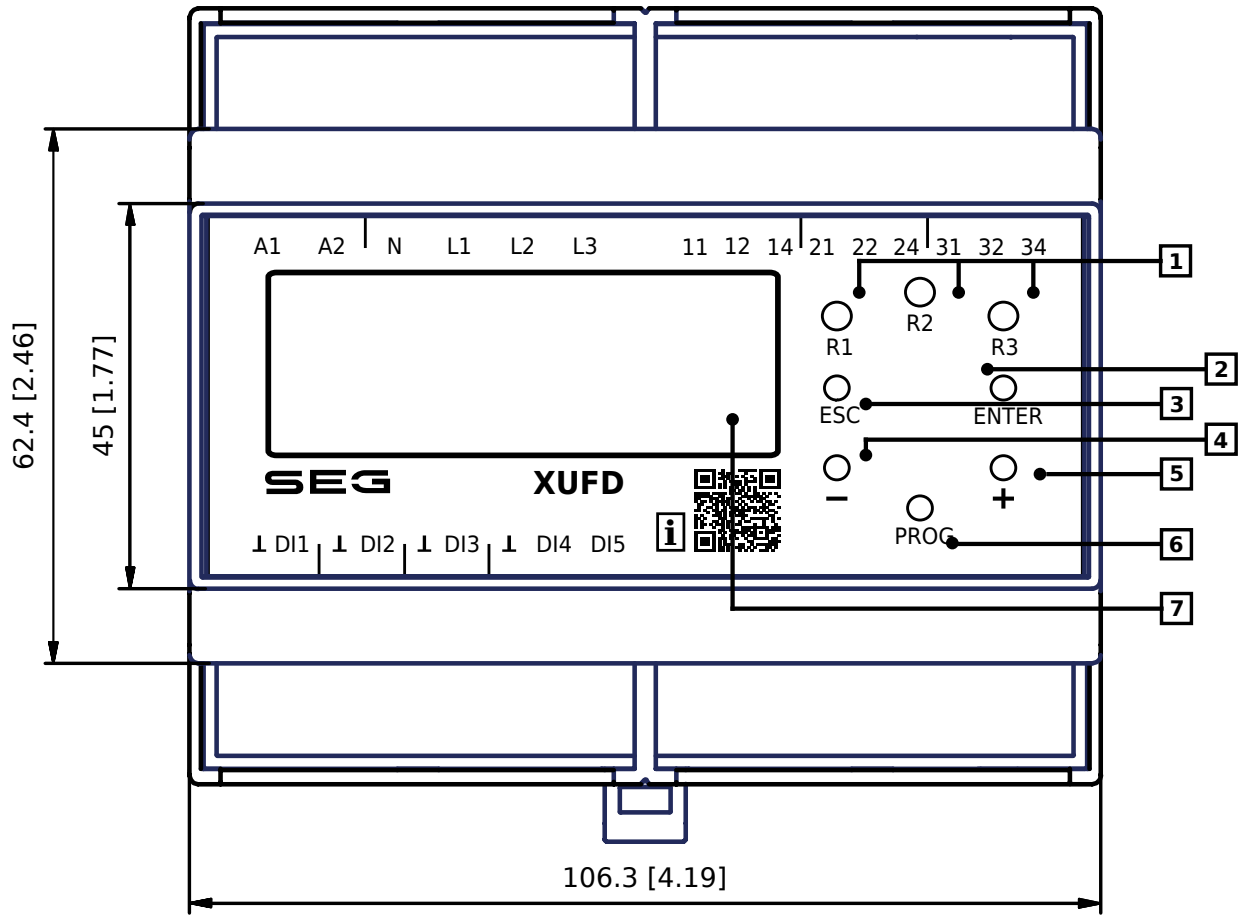



*Fig. 2: Front View with HMI. All dimensions in mm, except dimensions in brackets [inch].*

| Legend | Labeling | Type | Function |
|---|---|---|---|
| [1] | R1, R2, R3 | LED (yellow) | Output relay status display |
| [2] | ENT | Button | ENTER, input confirmation, next level |
| [3] | ESC | Button | ESCAPE, input rejection, back a level, Test |
| [4] | − | Button | Parameter setting, display change |
| [5] | + | Button | Parameter setting, display change |
| [6] | PROG | Button (can be sealed) | PROGRAM, programming |
| [7] | | LCD display (4 × 20 characters) | Display |

## 2.2 Mounting on DIN rail according to EN 60715

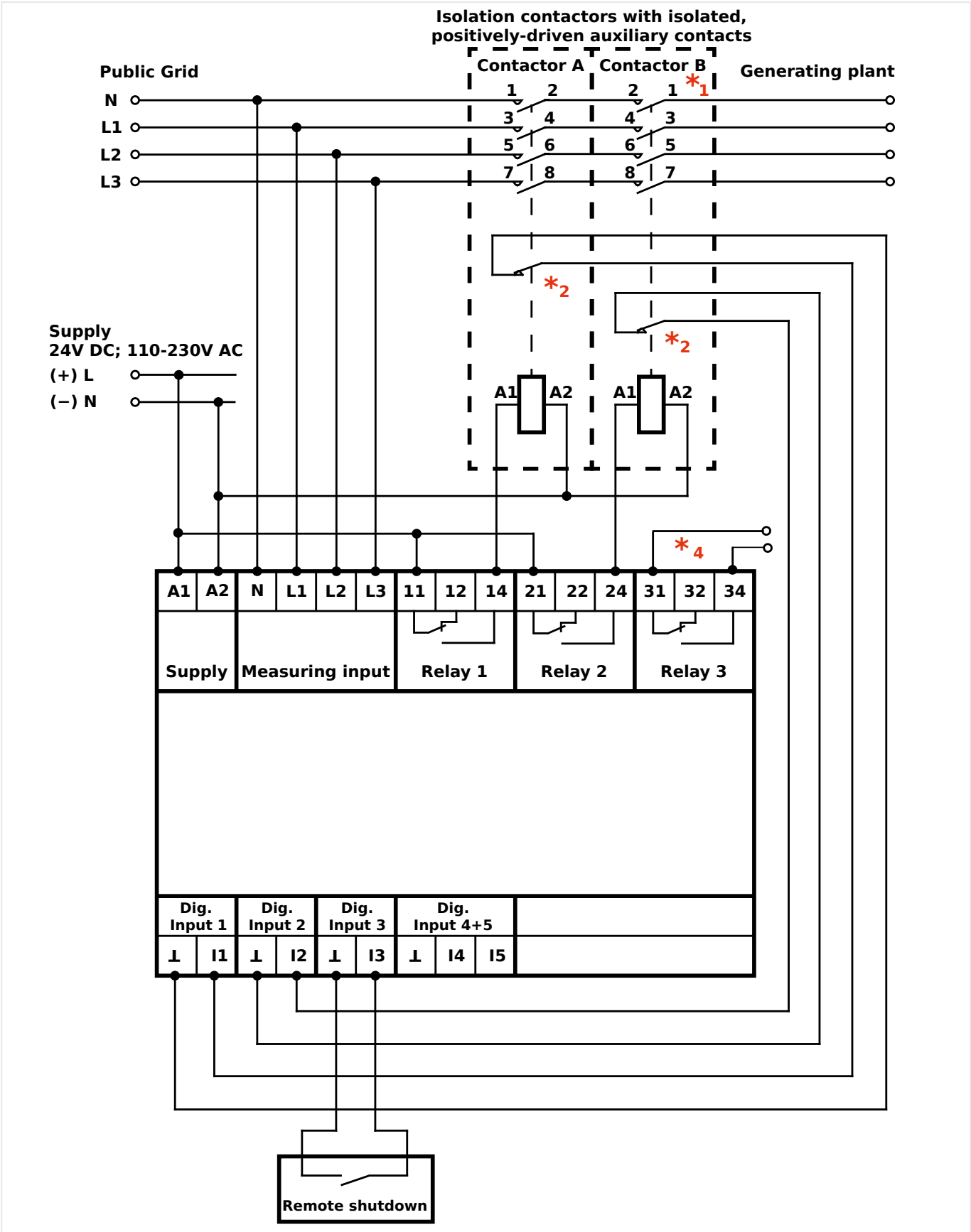
Snap the rear mounting clip of the XUFD into place in such a way that a safe and tight fit is ensured.

# 2.3 Wiring / Circuit Diagrams

### *Terminal allocation*

| | | |
|---|---|---|
| A1, A2 | Power supply | DC: 24 V<br>AC: 110 ... 230 V<br>A1: L (+)<br>A2: N (−) |
| L1, L2, L3, N | Measuring circuit | $U_N$: 3 × 400 V AC |
| 11, 12, 14 | Output relay channel A (changeover contact)<br>Status display through yellow LED R1 | Contact output (isolated)<br>11: Root<br>12: normally closed<br>14: normally opened |
| 21, 22, 24 | Output relay channel B (changeover contact)<br>Status display through yellow LED R2 | Contact output (isolated)<br>21: Root<br>22: normally closed<br>24: normally opened |
| 31, 32, 34 | Output relay channel (changeover contact)<br>Status display through yellow LED R3 | Contact output (isolated)<br>31: Root<br>32: normally closed<br>34: normally opened |
| I1, ⊥ | Digital input 1<br>(feedback contact of contactor A) | Contact input (24 V / 5 mA)<br>Input active: I1 and ⊥ connected (configurable) |
| I2, ⊥ | Digital input 2<br>(feedback contact of contactor B) | Contact input (24 V / 5 mA)<br>Input active: I2 and ⊥ connected (configurable)<br>Only applicable for country-specific standards that require functional safety! |
| I3, ⊥ | Digital input 3<br>(Remote shutdown) | Contact input (24 V / 5 mA)<br>Input active: I3 and ⊥ connected (configurable) |
| I4, I5, ⊥ | Digital inputs 4 and 5<br>(Parameter switchover) | Für CEI 0-21<br>Contact input (24 V / 5 mA)<br>Input active: I4 resp. I5 and ⊥ connected |

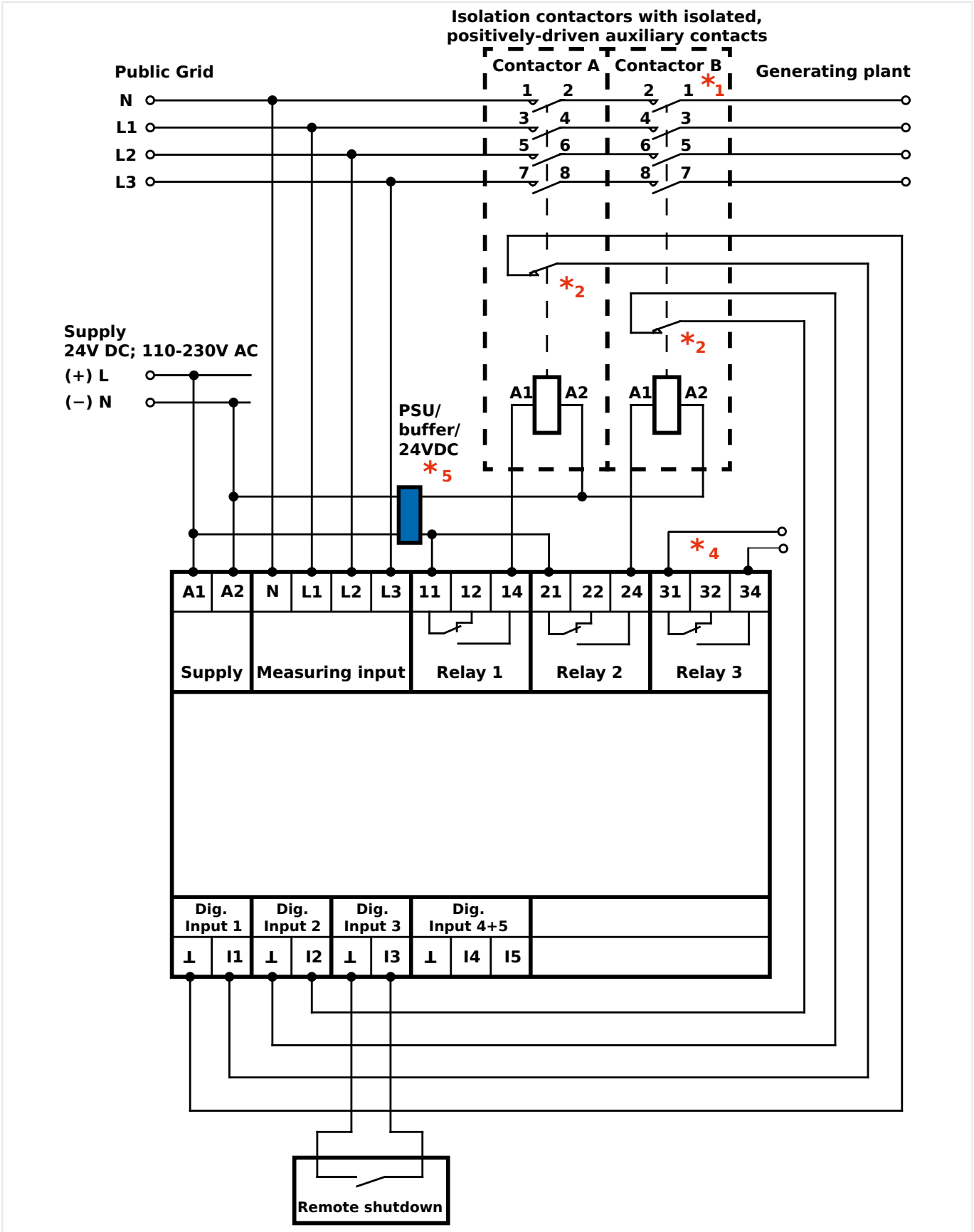
### *Circuit diagram 1 (general, without activities for FRT)*




*1 Contactor B is applicable only for country-specific standards that require functional safety.

| | |
|---|---|
| *2 | Auxiliary contact as normally opened, normally closed, or can be configured “not monitored”. |
| *3 | 1- or 2-channel connection possible and configurable. |
| *4 | Evaluation, contact error for autogeneration plants only for VDE-AR-N 4105:2018-11 and C10-11:2019 |
| *5 | VDE-AR-N 4105:2018-11 FRT (fault ride through) behavior with buffered isolation contactors. |

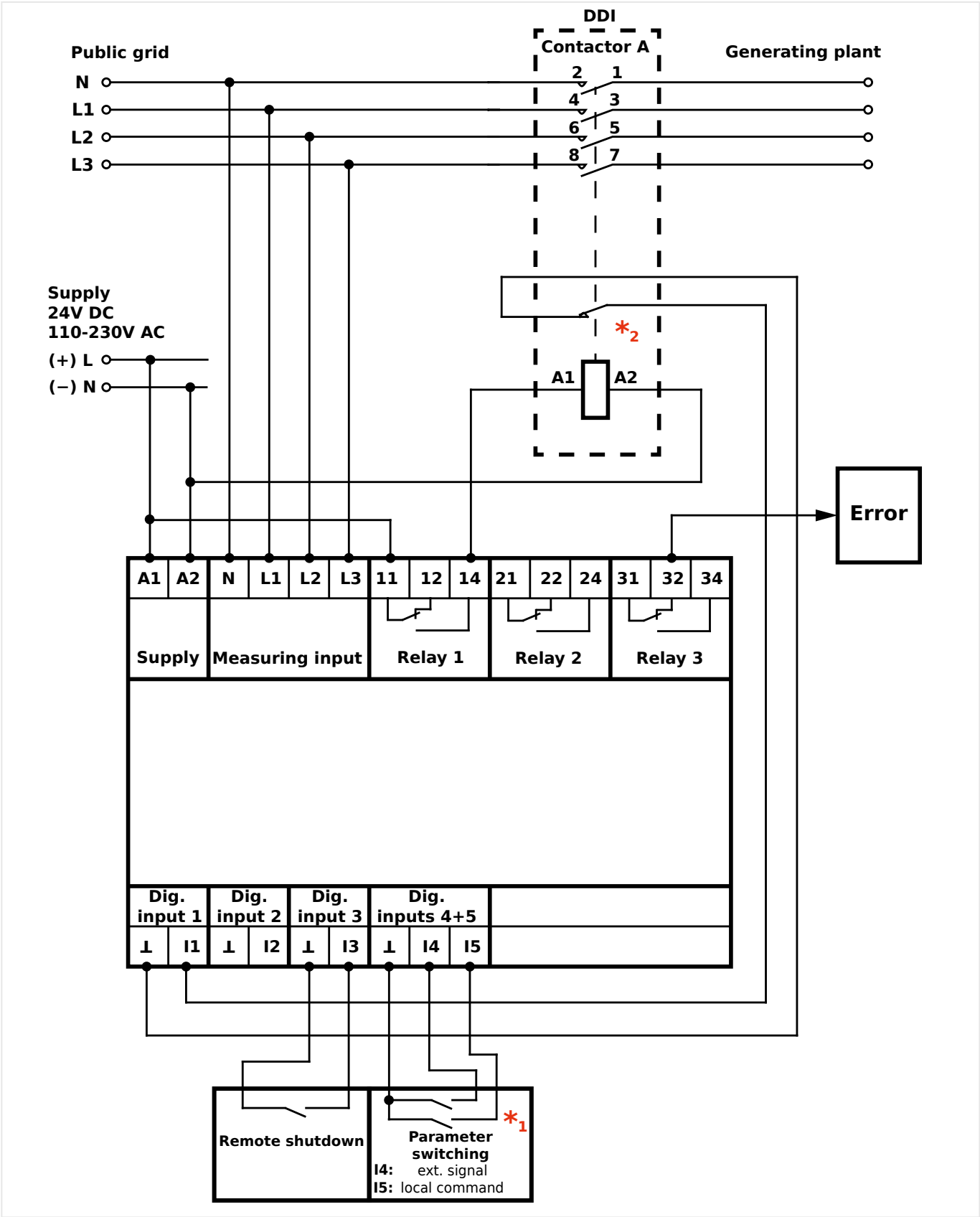
***Circuit diagram 2 (general, with activities for FRT)***




*1 Contactor B is applicable only for country-specific standards that require functional safety.

| | |
|---|---|
| *2 | Auxiliary contact as normally opened, normally closed, or can be configured “not monitored”. |
| *3 | 1- or 2-channel connection possible and configurable. |
| *4 | Evaluation, contact error for autogeneration plants only for VDE-AR-N 4105:2018-11 and C10-11:2019 |
| *5 | VDE-AR-N 4105:2018-11 FRT (fault ride through) behavior with buffered isolation contactors.<br>Power supply / buffer. Isolation contactors and coupling relays, if present, must be buffered for 3s/0.3s in the event of undervoltage (FRT).<br>Power generation devices into low-voltage networks must help to stabilize the network. Therefore, the isolating contactor must not drop out at a voltage just above U << (0.45 Un) or 0.3s in the event of a voltage interruption due to undervoltage. Only the XUFD switches the contactor off after 3s (U <) or 0.3s (U <<). A power supply / buffer is required.<br>When using 2 isolating contactors, both must be supplied for 3 s. The XUFD has an internal broadband power supply and therefore does not need a buffered control voltage.<br>ATTENTION with signal sequence: Buffer – XUFD – isolating contactor. The control signal must NOT be delayed! |

### *Circuit diagram 3 (CEI 0-21)*




*1 – Parameter switching:

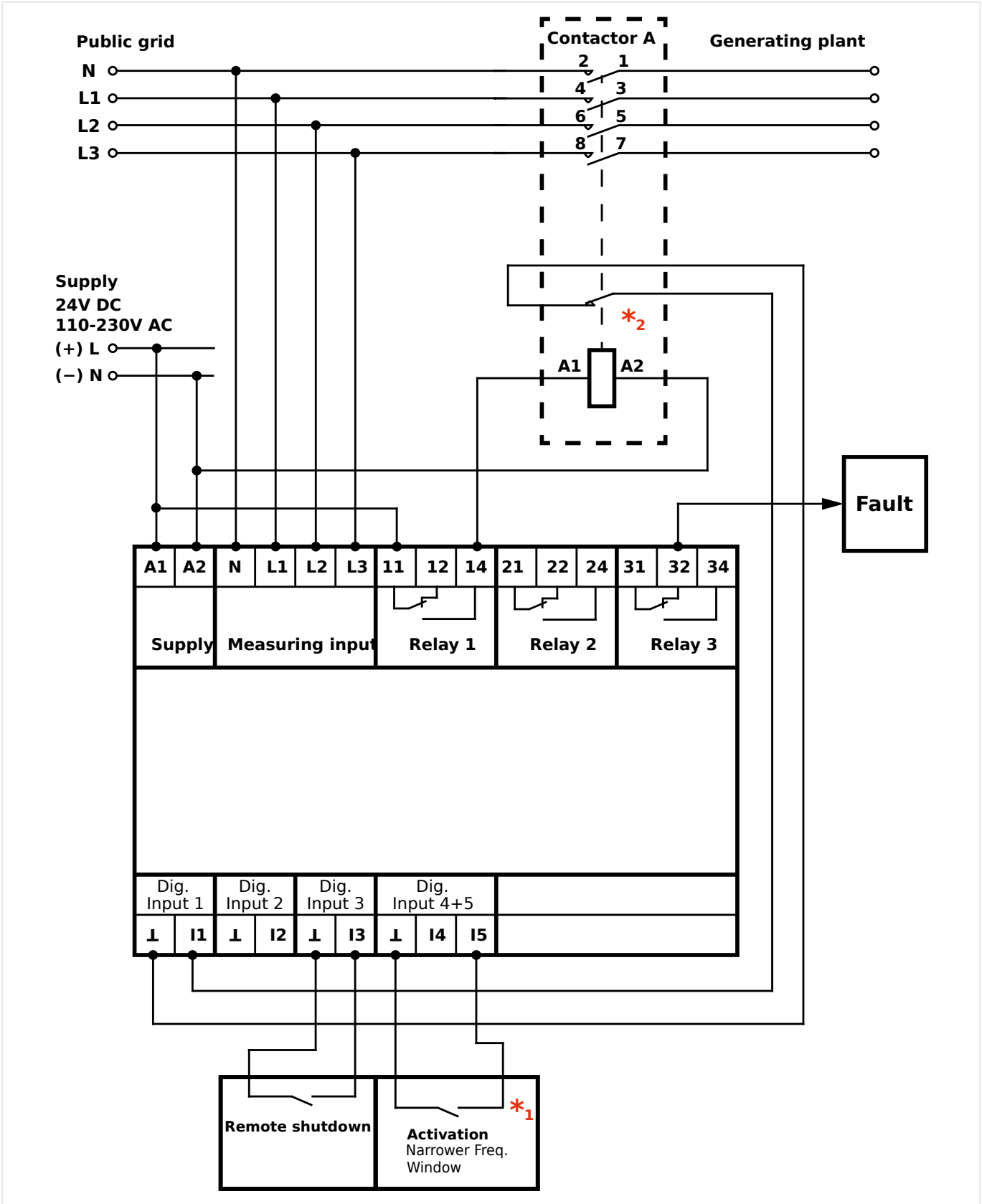
- definitive mode (Operational mode 0):

    - I4 inactive / contact open: overfrequency 1, underfrequency 1
    - I4 active / contact closed: overfrequency 2, underfrequency 2

- transitory mode (Operational mode 1):
    - I5 active / contact closed: overfrequency 2, underfrequency 2
    - I5 inactive / contact open: overfrequency 3, underfrequency 3

***2** – Auxiliary contact as normally opened, normally closed, or can be configured “not monitored”.

### *Circuit diagram 4 (C10/11)*




*1 – Parameter switching:

- I5 inactive / contact open: overfrequency 1, underfrequency 1

I5 active / contact closed: overfrequency 2, underfrequency 2 (narrower frequency window)

(based on local voltage criteria / local setting)

***2** – Auxiliary contact as normally opened, normally closed, or can be configured “not monitored”.

# 3 Available Configurations / Local Standards

## 3.1 Currently Available Standards

Note: In the “Circuit diagram” column, the numbers with asterisk refer to the corresponding legend entries in the referenced diagram.

| Slot | ID | Norm/Standard | Regions | Circuit diagram | Number of channels | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 Funct. safety | 1 or 2 selectable |
| #00 | 802 | OVE TOR R25 NS SYNC | Austria (low voltage) | 1/2 | | X | |
| #01 | 803 | OVE TOR R25 NS ASYNC | Austria (low voltage) | 1/2 | | X | |
| #02 | 852 | OVE TOR R25 MS SYNC | Austria (medium voltage) | 1/2 | | X | |
| #03 | 853 | OVE TOR R25 MS ASYNC | Austria (medium voltage) | 1/2 | | X | |
| #04 | 822 | OOE TOR R25 NS SYNC | Upper Austria Oberösterreich (low voltage) | 1/2 | | X | |
| #05 | 823 | OOE TOR R25 NS ASYNC | Upper Austria Oberösterreich (low voltage) | 1/2 | | X | |
| #06 | 872 | OOE TOR R25 MS SYNC | Upper Austria Oberösterreich (medium voltage) | 1/2 | | X | |
| #07 | 873 | OOE TOR R25 MS ASYNC | Upper Austria Oberösterreich (medium voltage) | 1/2 | | X | |
| #08 | 832 | W TOR R25 NS SYNC | Vienna (low voltage) | 1/2 | | X | |
| #09 | 833 | W TOR R25 NS ASYNC | Vienna (low voltage) | 1/2 | | X | |
| #10 | 882 | W TOR R25 MS SYNC | Vienna (medium voltage) | 1/2 | | X | |
| #11 | 883 | W TOR R25 MS ASYNC | Vienna (medium voltage) | 1/2 | | X | |
| #12 | 812 | TIROL TOR NS SYNC | Tyrol (low voltage) | 1/2 | | X | |
| #13 | 813 | TIROL TOR NS ASYNC | Tyrol (low voltage) | 1/2 | | X | |

| Slot | ID | Norm/Standard | Regions | Circuit diagram | Number of channels | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 Funct. safety | 1 or 2 selectable |
| #14 | 862 | TIROL TOR MS SYNC | Tyrol (medium voltage) | 1/2 | | X | |
| #15 | 863 | TIROL TOR MS ASYNC | Tyrol (medium voltage) | 1/2 | | X | |
| #16 | 311 | VDE-AR-N 4105: 2018 (Pn ≤ 50kW) | Germany (low voltage) | 1/2 *1 *4 *5 | X | | |
| #17 | 312 | VDE-AR-N 4105: 2018 (Pn > 50kW) | Germany (low voltage) | 1/2 *1 *4 *5 | X | | |
| #18 | 313 | VDE-AR-N 4105: 2018 (converter) | Germany (low voltage) | 1/2 *1 *4 *5 | | X | |
| #19 | 706 | VDE-AR-N 4110: 2018 (Pn > 135kW) | Germany (medium voltage) | 1/2 *1 *4 *5 | X | | |
| #20 | 102 | CEI 0-21: 2019 | Italy | 3 | X | | |
| #21 | 410 | G99/1/3: 2018 LV | Great Britain (low voltage) | 1/2 *1 | X | | |
| #22 | 460 | G99/1/3: 2018 HV | Great Britain (medium/high voltage) | 1/2 *1 | X | | |
| #23 | 510 | G98/1/2: 2018 | Great Britain (low voltage) | 1/2 *1 | X | | |
| #24 | 603 | C10-11: 2021 LV-IP | Belgium (low voltage) interface protection | 4 | X | | |
| #25 | 602 | C10-11: 2019 LV-ASS | Belgium (low voltage) automatic separation system | 1/2 *1 *4 | X | | |
| #26 | 653 | C10-11: 2021 HV-IP | Belgium (medium/high voltage) interface protection | 4 | X | | |
| #27 | 652 | C10-11: 2019 HV-ASS | Belgium (medium/high voltage) | 1/2 *1 *4 | X | | |

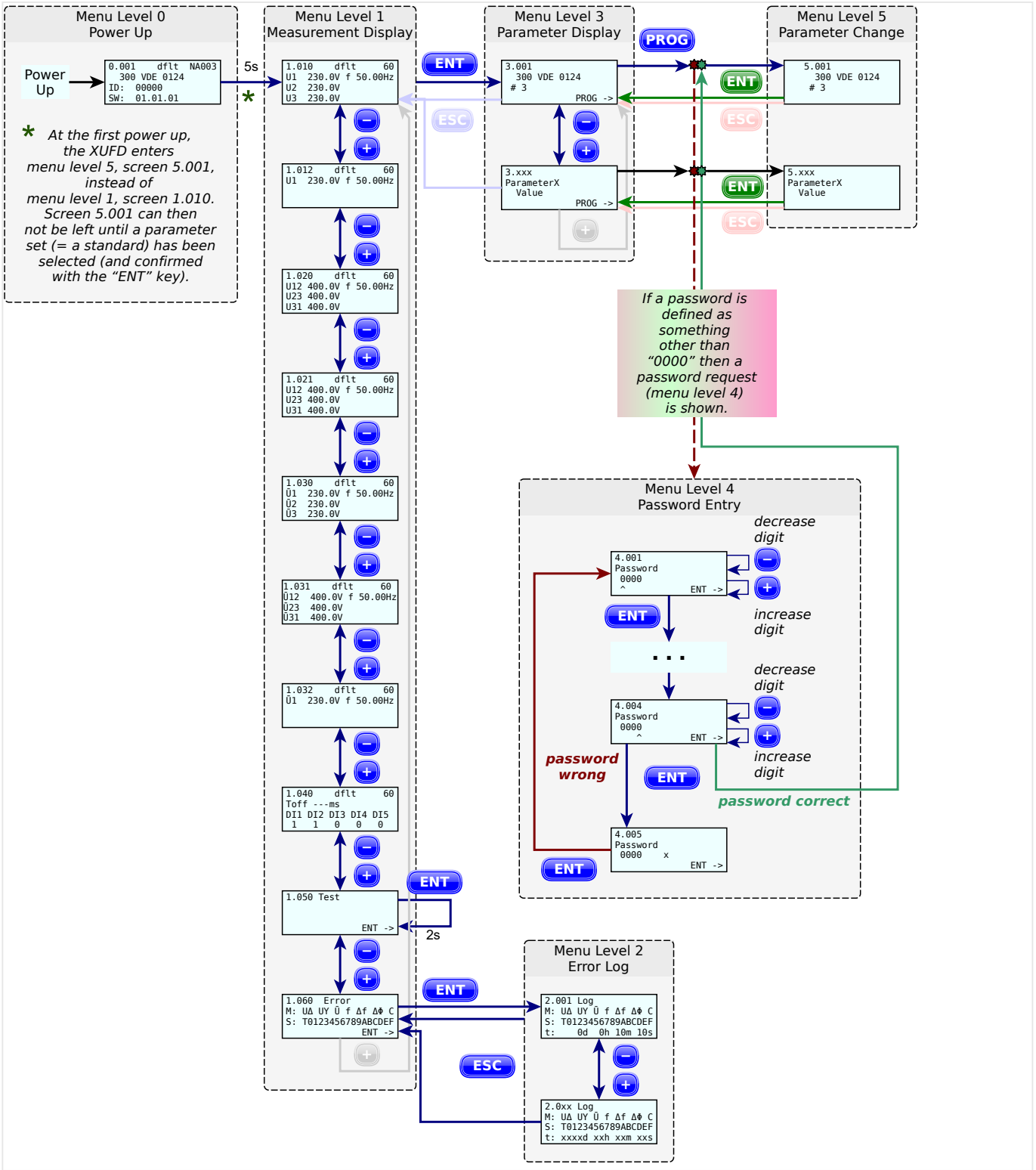
| Slot | ID | Norm/Standard | Regions | Circuit diagram | Number of channels | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 Funct. safety | 1 or 2 selectable |
| | | | automatic separation system | | | | |
| #28 | 1200 | NA/EEA- CH 2014 (Type A) | Switzerland 2014 (low voltage) | | | X | |
| #29 | 1220 | NA/EEA-NE7 - CH 2020 (Type A) | Switzerland 2020 (low voltage) | | | X | |
| #30 | 1221 | NA/EEA-NE7 - CH 2020 (Type B) | Switzerland 2020 (low voltage) | | | X | |
| #31 | 901 | EN 50549-1:2019 | Europe LV (Netherlands) | 1/2 | | X | |
| #32 | 902 | EN 50549-2:2019 | Europe HV (Netherlands) | 1/2 | | X | |
| #33 | 950 | EN 50438: 2013 DK | Denmark | 1/2 *3 | | | X |
| #34 | 200 | VDE V 0126-1-1:2013 | France, Turkey, Belgium, Greece, ... | 1/2 | | X | |
| #35 | 1110 | AB AS 4777.2:2020 | Australia | 1/2 | | X | |
| #36 | 1120 | C AS 4777.2:2020 | Australia | 1/2 | | X | |
| #37 | 1130 | NZS 4777.2:2020 | New Zealand | 1/2 | | X | |
| #38 | 1000 | NRS 097-2-1: 2017 | South Africa | 1/2 | | X | |
| #39 | 9006 | OPEN SETUP | Freely configurable setup | 1/2 *3 | | | X |

## 3.2 Recertified / Obsolete Standards

Note: In the “Circuit diagram” column, the numbers with asterisk refer to the corresponding legend entries in the referenced diagram.

| Slot | ID | Recertified / Obsolete Norm/ Standard | Regions | Circuit dia-gram | Number of chan-nels | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 Funct. safe-ty | 1 or 2 select-able |
| #52 | 900 | EN 50438:2013 | Europe | | | X | |
| #53 | 801 | OVE E 8001/8101:2014 | Austria | | | X | |
| #54 | 300 | VDE-AR-N 4105<br>tested according to<br>VDE 0124-100:2013 | Germany (low voltage) | | | X | |
| #55 | 700 | TR3 Rev23:2013<br>certified according to<br>BDEW 2008 | Germany (medium voltage) | 1/2 *1 | X | | |
| #56 | 1102 | AS/NZS 4777.2:2015 | Australia / Victoria (New Zealand) | | | X | |
| #57 | 405 | G59/3/3: 2015 LV | Great Britain (low voltage) | 1/2 *1 | X | | |
| #58 | 455 | G59/3/3: 2015 MV | Great Britain (high voltage) | 1/2 *1 | X | | |
| #59 | 500 | G83/2: 2012 | Great Britain (low voltage) | 1/2 *1 | X | | |
| #60 | 600 | C10-11: 2012 LV | Belgium (low voltage) | 1/2 *1 | X | | |
| #61 | 650 | C10-11: 2012 MV | Belgium medium voltage | 1/2 *1 | X | | |
| #62 | 601 | C10-11: 2019 LV | Belgium (low voltage) | 1/2 *1 *4 | X | | |
| #63 | 651 | C10-11: 2019 HV | Belgium (high voltage) | 1/2 *1 *4 | X | | |

# 4 Menu Structure




***Remark about the password:***

If a parameter set / standard according to VDE-AR-N 4105 is set then the password gets automatically set to 4105.

(For any other standard, the password is set to `0000`, which is a special value with the effect that the password query is skipped.)

Remark about menu levels 1, 3, 5:

- dflt = default
- edit = edited
- ncnf = non-conform

(Within menu level 1, these designations refer to all the settings within the set standard. Within menu levels 3 and 5, they refer to only the displayed parameter.)

***Remark about the error log, screen 1.060 and menu level 2:***

M: Measuring errors:

- UΔ = Line-to-line voltage
- UY = Line-to-neutral voltage
- Ū = Average voltage
- F = Frequency
- Δf = RoCoF
- ΔΦ = Phase shift
- C = Auxiliary contact

S: System errors:

- T = Remote disconnection
- 0 = CODEID
- 1 = CCODEVERS
- 2 = CODECRC
- 3 = FLASHCRC
- 4 = EEPROMCRC
- 5 = LOGICVERS
- 6 = LOGICCRC
- 8 = POWER6V
- 9 = POWERDIGINP
- A = MEASCOMPAB
- B = PWDINACTIVE
- C = INTERCOM1

# 5 Technical Data – XUFD

## 5.1 Supply circuit

| | |
|---|---|
| Terminals | A1 (L or +); A2 (N or –) |
| Supply voltage | DC: 24V<br>AC: 110 – 230V |
| Tolerance of the supply voltage | DC: ± 10%<br>AC: ± 30% |
| Nominal consumption | max. 1.25W / 4VA @ 230V AC |
| Nominal frequency | 50 / 60Hz |
| Tolerance of the nominal frequency | 48 – 63Hz |
| Duration of operation | 100% |
| Recovery time | 6 seconds + set turn-on delay |
| Drop-out voltage | 7V |
| Overvoltage category | III |
| Rated surge voltage | 6 kV |
| Internal fusing | 250V / 500mA slow blow (soldered) |

To ensure the device's functionality during a power failure, the device must be supplied via an external UPS system!

## 5.2 Measuring circuit

| | |
|---|---|
| Terminals | L1-L2-L3-N |
| Measuring input | 3x 400 VAC |
| Input impedance | 1 MΩ |
| Measured quantities | Phase to phase voltage, phase-to-neutral voltage,<br>10 minutes voltage average, frequency,<br>frequency change (RoCoF),<br>Phase shift (PShift), Zero Sequence |

## 5.3 Measuring ranges

| | |
|---|---|
| Phase voltage | 0 – 560VAC |
| Phase-to-neutral voltage | 0 – 325VAC |
| Frequency | 40 – 65Hz (measured between L1/N) |
| RoCoF | 100mHz/s – 2.000mHz/s |
| PShift | 1 – 15° |

| | |
|---|---|
| Overload capacity | Permanent 1.4 × UNom<br>Impulse 1.6 × UNom (1 second) |
| Overvoltage category | III |
| Rated surge voltage | 4 kV |

## 5.4 Digital inputs

| | |
|---|---|
| Terminals | I1 and ⊥ ; I2 and ⊥ ; I3 and ⊥ ; I4 resp. I5 and ⊥<br>I1, I2, I3 can be configured as n.c., n.o. and dis. |
| Contact type | potential-free (max. cable length 30m, laying as a control line, separate from power cables) |
| Switching capacity | 24V DC / 5mA |

## 5.5 Output circuit

| | |
|---|---|
| Terminals | 11-12-14; 21-22-24; 31-32-34 |
| Number and type of contacts | 3 changeover contacts |
| Contact material | AgNi |
| Switching capacity | 5A / 250V AC |
| Electrical switching frequency (AC1-) | 100 x 103 switching cycles |
| Mechanical switching frequency | 15 x 106 switching cycles |
| Continuous current value | 5A |
| Short time value (1s) | 5A |
| Withstanding voltage across open contacts | Relay contacts: 1000Vrms<br>Terminals: 450Vrms |
| Overvoltage category | III |
| Rated surge voltage | 4 kV |
| Fusing | 5A fast acting |

## 5.6 Accuracy

| | |
|---|---|
| Voltage measurement: | |
| Base accuracy | < 0,5% @ +25°C |
| Temperature effect | < 0,01%/°C |
| Resolution | 10mV |
| Frequency measurement: | |
| Base accuracy | < 0,01Hz @ +25°C |
| Temperature effect | < 0,0002Hz/°C |

| | |
|---|---|
| Resolution | 1mHz |
| Start-up Ton delay | 0...600s ± 0,6% |
| response-delay (TIME OFF), tUTHR OFF | 0...300s ± 0,6% |
| Reset (Release) delay, tUTHR ON_total | 130ms ± 45% |
| Operating time at overvoltage tover | 95ms ± 50% |
| Operating time at undervoltage tunder | 95ms ± 40% |
| Response time, toff_total_over/under | toff_total_over = tover + tUTHR OFF<br>toff_total_under = tunder + tUTHR OFF |
| Overshoot time | 40ms |

## 5.7 Insulation data

| | |
|---|---|
| Rated insulation voltage | 400V |
| Insulation | |
| Supply circuit/measuring circuit | Safe isolation |
| Supply circuit/output circuit | Safe isolation |
| Supply circuit / digital inputs | Safe isolation |
| Output circuit/measuring circuit | Base isolation |
| Output circuit / digital inputs | Base isolation |

## 5.8 Environmental conditions

| | |
|---|---|
| Ambient temperature operation | −25 up to +65°C |
| Ambient temperature storage | −40 up to +70°C |
| Display capability | −15 up to +65°C |
| Relative air humidity | 5 up to 95% |
| Degree of contamination | 2 |
| Weight | 300g |
| MTTF | 93000h (for display temperature 25°C ± 5°C) |

## 5.9 Electrical connection

| | |
|---|---|
| Connection cross-section | max. 2.5mm2 |
| Stripping length | max. 8mm |
| Electrical capacity of the clamps:<br>Relay outputs / digital inputs<br>Measuring inputs | max. 450V/16A<br>max. 750V/16A |
| Tightening torque | max. 0.5Nm |

| | |
|---|---|
| Screw | M3, screwdriver for slotted screws 0.6 × 3.5mm |
| Digital input circuits and output relays | No limitation for simultaneous operation of inputs and/or outputs within the specified limits |

## 5.10 Sealing wire

| | |
|---|---|
| Wire diameter | Ø max. 1.32mm |

## 5.11 Protection class

| | |
|---|---|
| Terminals | IP 20 |
| Housing | IP 20 |

PROTECTION MADE SIMPLE.

# Professional Line

# XUFD

## BASIC MANUAL

docs.SEGelectronics.de/xufd



SEG Electronics GmbH
Krefelder Weg 47 • D–47906 Kempen (Germany)
Telephone: +49 (0) 21 52 145 0
Internet: www.SEGelectronics.de

Sales
Telephone: +49 (0) 21 52 145 331
Fax: +49 (0) 21 52 145 354
E-mail: sales@SEGelectronics.de

Service
Telephone: +49 (0) 21 52 145 600
Fax: +49 (0) 21 52 145 354
E-mail: support@SEGelectronics.de

Complete address / phone / fax / email information for all locations is available on our website.